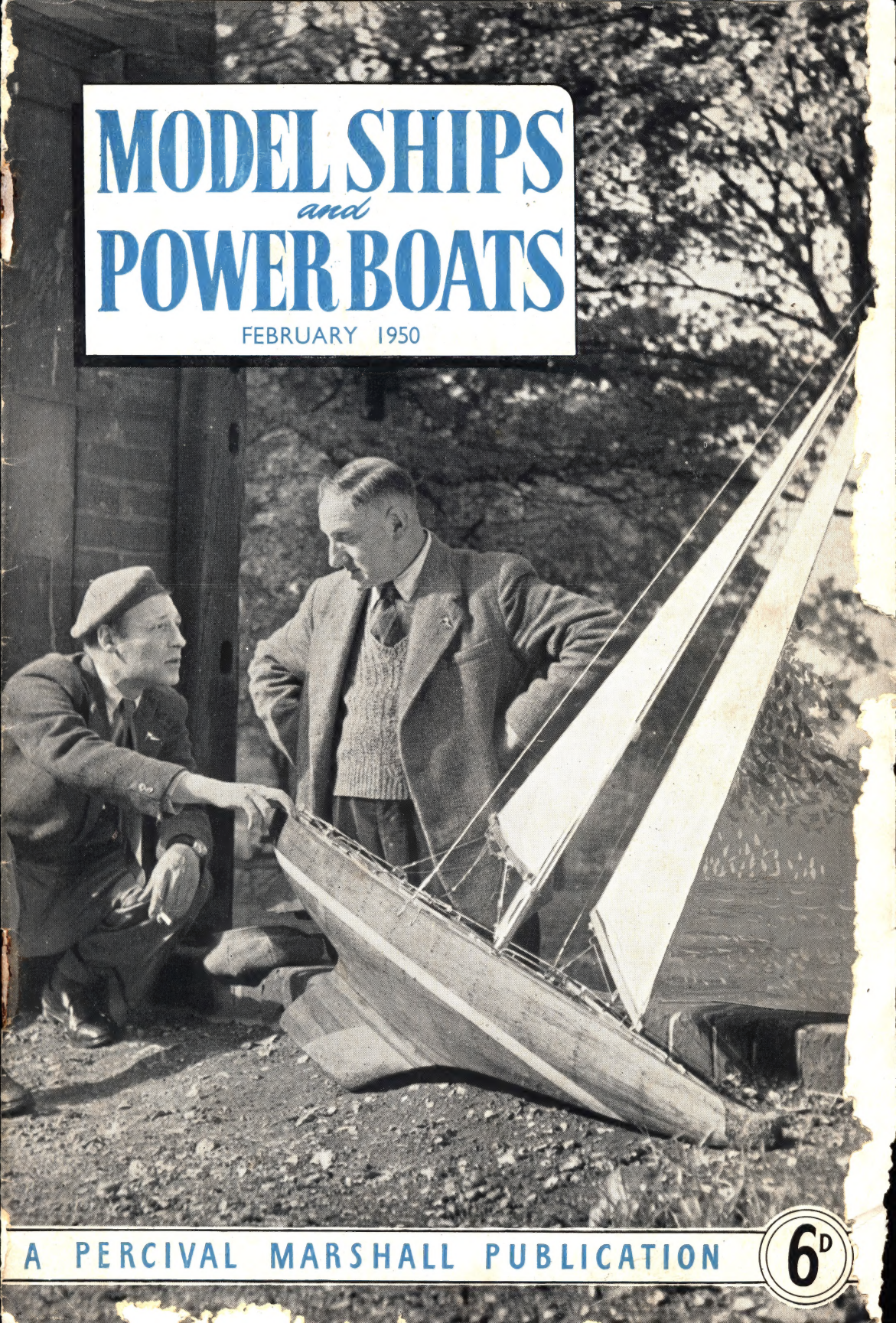
MODEL SHIPS *and* POWER BOATS

FEBRUARY 1950



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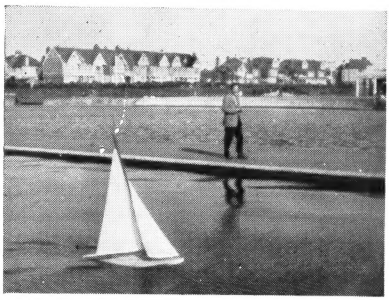

Photograph of the model sailing on Hove Lagoon

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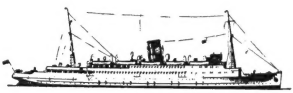

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Model Ships and Power Boats

VOL. 2 No. 26 *Editor : Edward Bowness* FEBRUARY, 1950

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The Ship's Log

Our New Series

Readers who have seen in the National Press the recent announcement on the lifting of restrictions on paper consumption by periodicals publishers, will doubtless be anxiously awaiting our announcement as to how this relief will apply to our journal. We are, therefore, pleased to be able to tell our readers that beginning with the issue dated March, 1950, we shall be able to present a bigger and better paper. The page size will be increased, there will be more pages, and readers can expect to receive, by way of contents, roughly twice as much material per month as we have been able to present hitherto.

The larger page will enable us to reproduce drawings to a more convenient scale, and this, with the better quality of paper we hope to obtain, will make for better all-round presentation of illustrations.

The increased number of pages will enable us to give more detailed instructions on the actual construction of models of all types. To assist ship modellers in their research, we hope to publish from time to time particulars of the more interesting ships, both historical and modern. We invite our readers to send in their queries, and will publish those of more general interest along with the replies.

May we remind our readers that we are always willing to consider articles for publication ; also working drawings and photographs which we think will be of interest and value to other readers.

Unfortunately, our January number had gone to press before the announcement was made in the House, and as restrictions are still in force until the 1st of March, our January and February numbers must, in any case, remain in the old size. We have, therefore, decided that the February issue will be numbered Volume 2, Number 26, and recommend that readers who bind their copies should include the January and February issues with Volume No. 2. The March issue in the new size will then be numbered Vol. 3, and future volumes will begin in March each year.

Inevitably, we shall have to increase the price of the journal. With paper and printing costs roughly three times greater than in pre-war days, we could not hope to give our readers this bigger and better paper at the old price. Beginning with the March issue, therefore, the price will be 1s. 0d. per copy, and the annual subscription 13s. 6d. post free to any address. Subscribers' accounts will be adjusted to meet the new cost, the balance of credit remaining at the end of February being applied towards the new subscription rate. Renewal dates will, of course, be notified to each subscriber direct as usual. Alternatively, any direct subscriber wishing to terminate his subscription will, of course, receive a refund of the balance due to him at the 28th of February, 1950.

H.M.S. Implacable

The sinking of the old *Implacable* severs a very important link with the past, especially as regards the history of the old wooden walls that served our country so

well during the Napoleonic wars. Actually, of course, the *Implacable*—at that time the *Duguay Trouin*—fought against us, but that fact might even add to her interest for ship modellers as it gave us an example of French ship-building methods as compared with our own. As we had been photographing certain internal details of H.M.S. *Victory* shortly before the sinking of the *Implacable*, it was suggested that similar photographs should be taken of the smaller ship. Through the enthusiastic support of Mr. Frank G. G. Carr of the National Maritime Museum, and the courtesy of the Admiralty, this was made possible, and as a consequence we have secured a permanent record of many of the constructional features of both ships. However much we may regret the passing of the *Implacable* it will be some consolation to students of naval architecture to know that such a record was obtained.

R.M.S. Aquitania

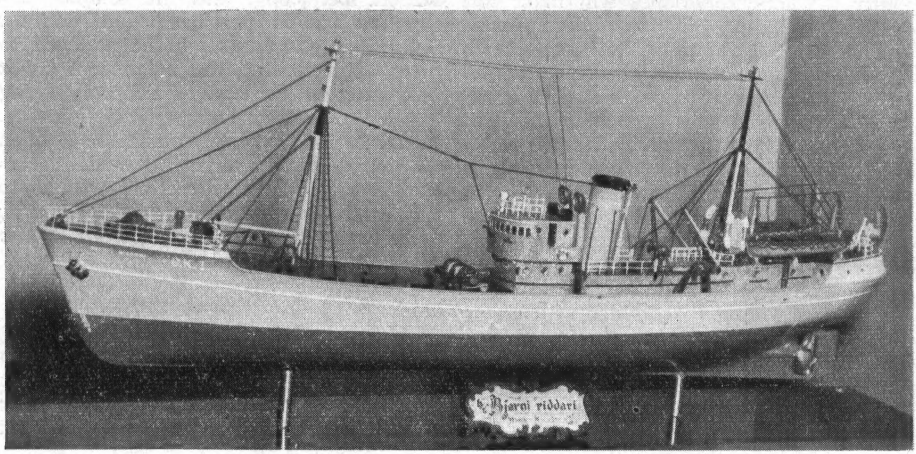
The announcement that the *Aquitania* is to be taken out of commission breaks another interesting link with the past. Although fashions have changed since she was built, there was a dignity and grace about the old steamship that was very impressive. The four great funnels, the long slender hull with its beautiful lines, the keen bows and especially the graceful counter stern, gave a wonderful impression of power and speed. Her older team-mate the first *Mauretania*, had these qualities to a degree. Not that we are unable to appreciate the beauty of the newer ships—the Cunard White Star "Queens" for instance are masterpieces of ship design—but there is something pathetic in the passing of ships which have been the objects of our admiration and affection for so many years.

Our Cover Picture

The photograph we have used this month will remind the model yachting section of our readers that unless we design and build and generally prepare for the summer while the cold, dark days are still with us, we will find ourselves without a boat, or at least, limited to the old boat when the sailing days come round again. The boat in the picture is owned by Mr. R. Glanville of Parliament Hill, N.W.3, and is a fine example of an "A" Class yacht with a planked hull. The photograph is by Mr. Henry Grant of Eaton Rise, N.W.3.

AN ICELANDIC SHIP MODEL MAKER

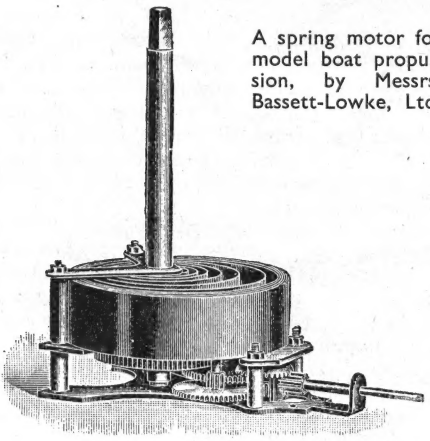
THE photograph which is reproduced below is of a model of the modern trawler *Bjarni Riddari*, built by Cook, Welton & Gemmell Ltd., Beverley, Yorkshire. It was made by Mr. Hermann Guomundsson, who is a member of the Parliament of Iceland. Mr. A. V. Long, of Hafnarfiroi, Iceland, who sent us the photograph, tells us that Mr. Guomundsson does not use modern tools but uses principally the ordinary pocket knife and a few files and rasps. His skill with these simple tools is very obvious as the details are very complete and very well finished. As might be expected of an Icelander, he has also a good eye for a ship. Mr. Long tells us that there are at least two other expert ship modellers in Iceland. We hope to hear more of their activities.



*MODEL MARINE POWER PLANTS

by *Edgar T. Westbury*

THE very simple forms of motive power are only of interest from the utility aspect ; they are regarded by the model power boat constructor purely and simply as a means to an end, rather than as something interesting to construct and run. Indeed, there are cases where it is hardly practicable to construct such devices at all, as in spite of their simple and straightforward working principles, they are of a complexity of construction out of all proportion to their mechanical interest, or even their utility. For this reason, I do not propose to discuss them in greater detail than is necessary to enable the uninitiated reader to obtain a grasp of their application and scope, not to mention an equally important factor, their limitations.



A spring motor for model boat propulsion, by Messrs. Bassett-Lowke, Ltd.

Before we get down to a practical discussion of any type of power plant, it is necessary to have a clear idea of what " power," in any shape or form, really means. This is a very elementary matter, which is dealt with at length in any textbook on the principles of mechanics. However, no apology is necessary for making a brief reference to it here, as there are some very hazy ideas as to its practical significance, in the particular sphere of application which we are considering. (The term " energy " represents the product of " force " and time, utilised over a long or short period.)

*Continued from our January issue, page 4.

" Power " may be defined as the rate at which force is applied ; the unit of mechanical force is the " foot-pound," or the amount of force required to raise a weight of 1 lb. through a vertical distance of 1 ft., against the opposing force of gravity ; power is therefore usually expressed in terms of foot-pounds per unit time. The standard unit of " horse-power " is 33,000 foot-pounds per minute, and any arrangement of the factors in the simple equation which produces this product will therefore represent one horse-power ; as, for instance, 33 lb. lifted 1,000 ft. in 1 minute, 100 lb. lifted 33 ft. in 1 minute, or 330 lb. lifted 1,000 ft. in 10 minutes. Mechanical power is often transmitted by rotary motion, and the force exerted in this way is known as " torque," which is defined in terms of pounds-feet (not to be confused with foot-pounds), each of which represents a force of one pound, acting tangentially at a radius of 1 ft. from the shaft centre. Force acting in a linear direction is usually known as " thrust," and torque or thrust may be either " static " or " dynamic " according to whether it refers to stationary or moving bodies. Having defined the most important factors in the application of power, it is now possible to make practical comparisons between the various methods o producing and applying it.

Mechanical Power Storage

This was one of the earliest means of obtaining mechanical motive power and is still the most common method in small working models and toys. The power storage is usually obtained through the medium of an elastic material, such as spring steel or rubber (in the past, whalebone has been extensively used), but the force of gravity, applied through a falling weight, or an elevated column of water, can also be utilised in this way ; and yet another possibility lies in the use of an elastic fluid such as compressed air or gases.

For practical purposes in our particular sphere, we may at once rule out such methods as the falling weight or water column, since the limitations, both in respect of weight and space, preclude their use in a model boat ; but they form a simple and useful illustration of the way in which the amount of power obtainable

by any such methods must inevitably be limited to a comparatively small amount. For instance, suppose that a weight of 10 lb., with a fall of 10 ft., were used, this would represent a total available force of 100 ft.-lb. ; and if this force is completely expended in 1 minute, it represents 1/330 h.p., assuming that all mechanical losses are eliminated in the transmission system. No arrangement of gearing or other mechanism can possibly increase this amount of actual energy, though it can be made to produce a greater h.p., over a shorter period of time, or a smaller h.p. over a longer period of time. Conversion of the mechanical energy into some other form, such as electricity, is of no avail from the aspect of total power produced ; on the other hand, it will but increase the proportion of power wasted in transmission ; and these facts are as incontrovertible as the laws of the Medes and Persians, though misguided geniuses of all periods of history have spent their lives in trying to beat them.

Spring Motors

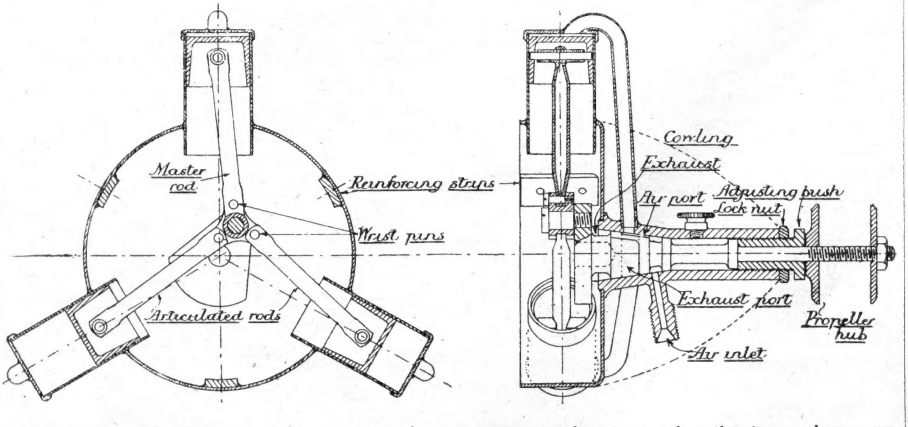
The familiar " clockwork " mechanism is often used in simple model boats, though I do not know of a single example of one which has been completely constructed by an amateur. Conversion of gramophone motors, or the wheel trains of large clocks, however, are by no means uncommon, though usually inefficient compared with motors specially designed and manufactured for the purpose.

It is very difficult to determine the actual amount of power which can be stored in a steel spring, but one may say that it would have to be a very large one to supply as much power as the falling weight quoted above, and the total weight of the motor would probably be at least as much as an equivalent weight-operated system. The mechanical losses in the multiplying gear train of a clockwork system are very high, particularly if the gears are not of extremely high accuracy. Unless some form of governing device is fitted, the major part of the power is expended very rapidly, tailing away to less and less effort as the spring runs down. It will, of course, be quite evident that the total amount of energy which must be applied to wind the spring must inevitably be greater than that recoverable as it runs down, the proportion depending on the mechanical losses in the gear train.

Queries are often asked regarding the size of propeller to use with a given size of clockwork motor, but the absence of data as to power and speed available makes it quite impossible to answer these in definite terms. The propeller acts as a water brake, governing the speed of the motor to some extent, and, altering either its pitch or diameter, will therefore allow the motor to run down either faster or slower, developing more or less power for a shorter or longer period of running. In this respect clockwork power is very flexible but there is generally an optimum rate of working which can only be found by experiment.

Rubber Motors

These have often been used for driving simple model boats, though they have never been so popular in this sphere as



A three-cylinder radial compressed air engine with rotary distribution valve

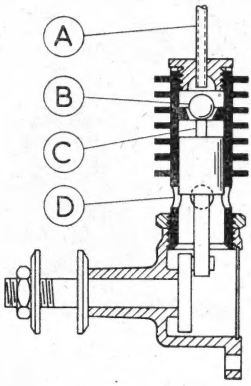
in model aircraft. Most conscientious boat constructors are deterred by the crudity of this form of power, but it may, like many other crude methods, be highly effective for its purpose. There is reason to believe that the rubber motor is potentially the most efficient of all forms of stored energy, and the fact that it can be made to dispense with a gear train still further enhances this efficiency. Some years ago, an authority on model aircraft made tests with rubber motors, and as a result of his findings announced that it was possible to store 18,000 ft.-lb. in 1 lb. of rubber—equivalent to over ½ h.p. for 1 minute. This, however, assumes perfect conditions, with the rubber brand new and well lubricated; the deterioration of this material in use is fairly rapid, and there is a wide variation in its quality.

Model speed boats driven by rubber have attained fairly high speeds for short bursts, but have little sustaining power. The tendency to race when first released is, if anything, worse with rubber motors than with spring motors, and though a speed governor is equally practicable with the former, the extra complication is rarely justified. Winding a powerful rubber motor is a tedious business, and though a system of gearing could be used to facilitate this, the same objections apply as to governing gear; the most popular winding device, the simple intercepting stop to lock the propeller after winding, until the boat is in the water and ready to run, is obviously a desirable fitting.

Compressed Air Engines

This system of power storage at least has the added attraction of using a " real engine," though in other respects it has few practical advantages over the methods previously described. Most small compressed air plants have been designed primarily for use in model aircraft, and are of the super-lightweight type, though this is no detriment to their use in boats, especially if a very light hull is used, with a view to high speed performance. But any reasonably efficient small steam engine can be run on compressed air, and examples have been known of converting a steam plant and utilising the original boiler as an air reservoir, though the capacity of the latter is usually inadequate for a run of any length. The tendency to " come in like a lion and go out like a lamb " is much the same with compressed air as with spring or rubber motors. It would be possible, however, to regulate the speed without much mechanical complication by using an automatic pressure-governing valve, but I do not know of this ever having been done in a small plant.

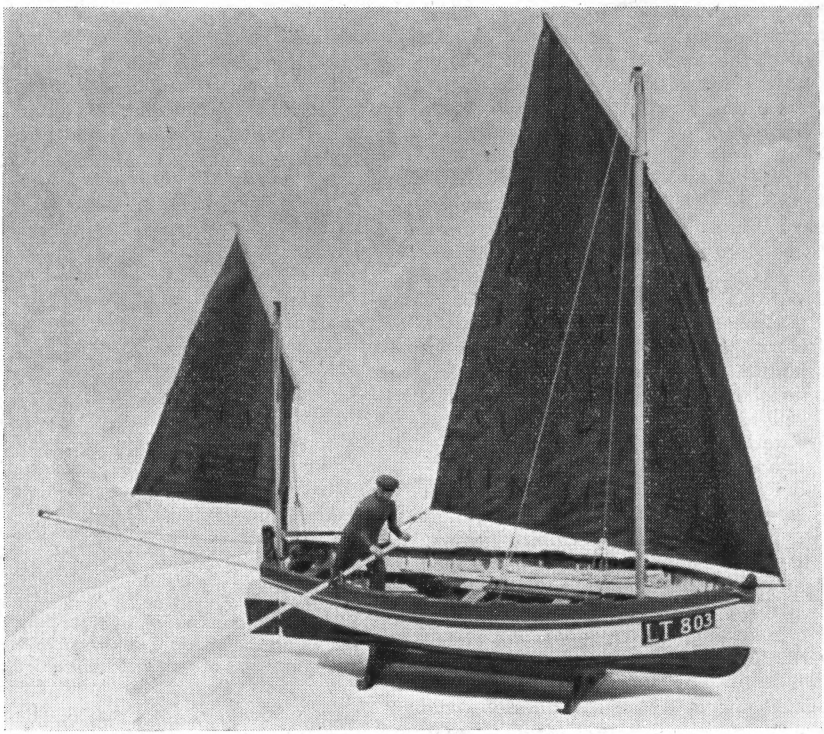
The physical effort of pumping up a compressed air container by hand is a great deterrent to its use, and some attempts have been made to eliminate this hard labour by using, instead of compressed air, a pre-compressed or " bottled " gas, such as carbon dioxide. Many years ago, a model aircraft engine of this type was produced in France, using a " Sparklet " bulb, as employed in the home production of aerated, or more correctly carbonated, mineral water. This idea has been revived in recent years by an American manufacturer, who has produced a tiny and very simple engine working on the uni-flow principle, in which the pressure is obtained from a " Sparklet " bulb. While this engine is very accurately made and appears to work very efficiently, the small quantity of working fluid which can be stored in this way limits the length of run to a few seconds only.



A simple CO_2 engine: A, gas inlet; B, ball admission valve, operated by the tappet on the piston C; exhaust released at the bottom of stroke by the ports D.

Attempts have sometimes been made to use compressed air or gas in discharge jets to produce reaction propulsion, but the same general limitations prevail, and efficiency is usually much lower than when an engine is used. It is by no means impossible that much greater efficiency might be obtained from either air or gas by using a heating device to make up the heat energy lost in expansion, but no experiments have been made in this direction, so far as is known.

(*To be continued*)



OLD-TIME COASTAL CRAFT No. 7

The Suffolk Beach Punt

by *L. H. Foster*

THOUGH they varied somewhat in size and form this model of *Maria*, of Southwold, built there in 1886, is representative of the boats which traditionally carried on the inshore fisheries along the Suffolk coast. The development of the marine motor and the decay of the industry brought to an end the conditions and methods of an era dependent on sail for its motive power.

Maria was 17 ft. 3 in. in length and 6 ft. 9 in. in beam. The boats used trawls, drift nets, and long lines, according to the season.

Since the photograph was taken I have succeeded in obtaining netting of suitable mesh (2 in.), and the 17 ft. beam trawl has been added to the model.

For spratting, a drift net 30 yards long, set in to 21 yards on the head rope, was used ; mesh 62 to 66 rows to the yard ; depth 10 score meshes. A herring net was similar, but had a mesh of 36 rows to the yard. A fleet of nets usually consisted of 20.

The equipment included a leeboard, bags of shingle ballast, a " Molgogger " (a form of davit over which the warp was led when hauling the trawl), a Dan, Bowsing tackle, and a Boat Box in which were kept the smaller items necessary for working the boat.

The after bulkhead stopped about 3 in. below the thwart. When towing the trawl the warp led in over the quarter and a bight was taken under the thwart, back over it, and was then hitched to thole pins.

In the model, beech was used for the keel, stem, sternpost, deadwood, and knees ; planking, Columbian pine ; timbers, gunwale and risings, American elm ; soft brass pins for riveting up the planking. The rigging is surgical silk, properly spliced and fitted. Artists' oil colours were used for painting.

The man, who serves to make the scale of the model readily appreciable, is carved from a piece of yellow pine, except the head and hands which are made from pear-wood.

The model was made by the writer and was built to the scale of one-twelfth or 1 inch equals 1 foot.

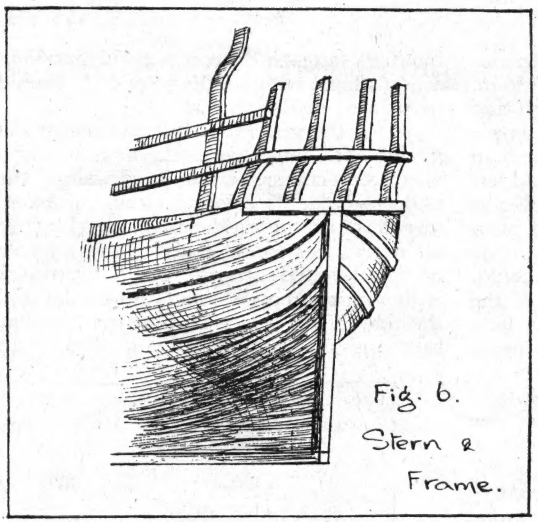


Fig. 6.
Stern & Frame.

*A Model Flemish Carrack

by

C. M. MILLWARD

THE stanchions being now firmly fixed, a shelf should be pinned on as shown in the Sheer Plan, to support the beams of the top castle. These are laid across next, also helping to stiffen up the frame, and then the deck goes on—remembering to pass the halliard block up through the aperture in the deck. The sides are pinned on exactly as those of the forecastle ; but no entrance is needed in the after breastwork, as this deck would be reached by a ladder from the deck below. The spaces between the stanchions left after fitting the deck, can remain open, to act as scuppers.

It will be seen in the Sheer Plan that the three pairs of stanchions continue above the top castle as far as the lower rail of the pent-house, while the foremost stanchion continues up to support the ridge-pole. This ridge-pole goes on the port side of the foremast, and should be triangular in shape. Place a stick in the mast-hole, and, pivoting the ridge-pole on the foremost stanchion, find where it will be vertically above the after breastwork, when just clear of the mast. A stanchion must be fitted here, against the breastwork, to support the after end of the ridge-pole. Then find the correct shape of the ridge-pole and of the two lower rails ; these will all be triangular, but as the pent-house roof is broader and flatter aft, the angles of the sides of the triangles will increase going forward. The slats of the pent-house roof should then be pinned in place, and the whole frame painted red. This pent-house would be covered with stout netting in war, to keep out boarders ; or for pomp would have bright awnings stretched over it.

*Continued from January issue, page 14.

The after castle is fitted in exactly the same way, with its pent-house. A stanchion must, however, be fitted in the centre of the counter, in the same way as the single one on the Knee of the Head, and continued up to support the ridge-pole. This ridge-pole is in the centre line, not having to pass the mizzenmast. The castle is entirely enclosed, as is the foretopcastle ; but two small entrances should be left, down to the middle rail, as in the after breastwork of the forecastle.

It will be seen from *D* in the Deck Plan that gangways, or " corridors," are fitted forward from the after castle to the waist. The shelf of the after castle should be carried forward to Section 9. A stout beam is then laid across at Section 9, and carlings are fitted from this beam to the foremost beam of the castle—that is, at Section 16. Pillars should be placed under the beam at Section 9, where the carlings are attached, bearing on the deck beneath ; the rail of the poop bulkhead will require to be notched to take these pillars. Finally, short beams fit from the carlings to the remaining stanchions, and the deck is laid in the same manner as that at the waist, except that the planking must lie fore and aft ; there would be nothing to receive the ends of the planks between the stanchions, if laid athwartships as at the waist. Finally, the top and bottom rails of the castle are continued forward to Section 9, to form the framing of the " pavisade " as this light fence was known. On this hung wooden shields, or " pavises," decorated with divers coats of arms. These shields should be fitted next, cut slightly convex on their outer surfaces. They should each have a staple at top and bottom, by which to fasten them to the pavisade, and

their inner surfaces should be red. In size they should be about 5 ft. long by 2 ft. 6 in. wide, and can be painted in any design that suits the fancy ; an idea of the simple heraldic designs in use at the time can easily be obtained. If required small ladders can be fitted leading up to the hatches of these top castles. As they were used principally for fighting, however, the ladders were probably not fixtures. Slats should, however, be fitted across the curve of the cowbridgehead, on each side, say 4 ft. long and set about 2 ft. apart, to facilitate access to the forecastle from the waist.

Also, a ringbolt is required on each side, just at the foot of the cowbridgehead—see Deck Plan *B* ; these are for the lashings of the anchors.

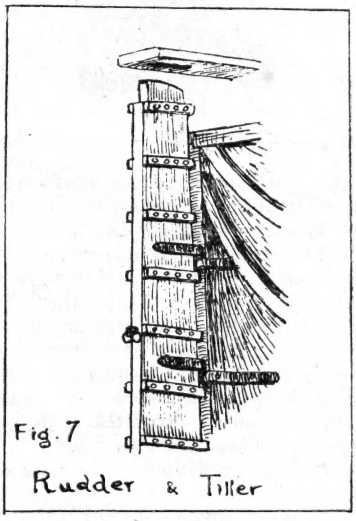
The counter is still unfinished ; the curve of the lower counter is best formed in one piece, owing to the rudder port. The upper counter should also be in one piece, the windows and a door into the " garderobe " on each side being cut out first—see Body Plan. These garderobes, or lavatories, are then built up of light wood, as shown. Between them fits a small gallery with two rails, and on the roof of each is a ringbolt for the sheets of the lateen mizzen. The three windows looking out on to the gallery should be glazed—celluloid or cellophane are excellent for this. On a model of sufficient size a good dodge is to glue a little piece of fine netting to the outside of each window. This, when suitably coloured, gives a very good imitation of leaded panes.

A small painted shield is fastened beneath each garderobe, to the curve of the lower counter.

The rudder is built up as shown on the Sheer Plan. It has eleven reinforcing pieces on each side, to bind it together, and four pintles. The reinforcing pieces can be of wood or Bristol board, and small pin-heads should be inserted—four to each piece—to represent bolts. If it is desired that the rudder should swing, the pintles and straps on the hull must be made strongly of brass or tin. In a small model, however, it is sufficient to fasten on strips of Bristol board to represent these fittings, and to attach the rudder to the stern post by pins driven into each, where the pintles are fitted. The tiller fits down over the rudder head which should be shaped to receive it ; see Fig. 7. The steering of this ship would be effected by tackles. An eye should be put into the rudder where shown on the Sheer Plan, and in this two rings are fitted ; these are for the rudder lines, which served as emergency tackles if the tiller broke.

The figurehead can be fitted to suit the builder's taste—a dragon, a crouching lion, a lion's head with snarling jaws. It should be painted gold.

As for the general colour scheme of the model, Mr. Nance has made the hull a light oiled wood colour, with dull red wales ; the underbody a dark colour, as it was probably tarred ; and the rudder plain wood colour all over. His topsides above the topwale he has painted green—middle Brunswick is the approximate shade ; his castles and the sides of the forecastle blue, with yellow rails and the arrow loopholes edged with yellow. The beams beneath the forecastle are red, and the poop bulkhead blue and yellow triangles. In the stern, green is the prevailing colour, while the garderobes are white outside, red inside and with dark roofs. The knuckle timber across the counter being a continuation of the second wale, should be red ; and the edges of the windows should be picked out delicately with yellow. All decks should be plain oiled wood colour above and red beneath, this applying also to the stern gallery. The rails of this should be oiled oak. All ironwork, ringbolts, etc., should be black.



This colour scheme will be found to be gay and bright, but not gaudy. It should be carried out in flat colours ; or if a varnish is preferred it should be very light. An ancient appearance is to be preferred.

This series, which was submitted to " Ships and Ship Models " some years ago, was unfortunately terminated at this point by the death of the author. We propose to complete it ourselves so that readers may have all necessary information available for the construction of the complete model. [EDITOR.]

MODEL SHIPS
AND
POWER BOATS

VOLUME TWO

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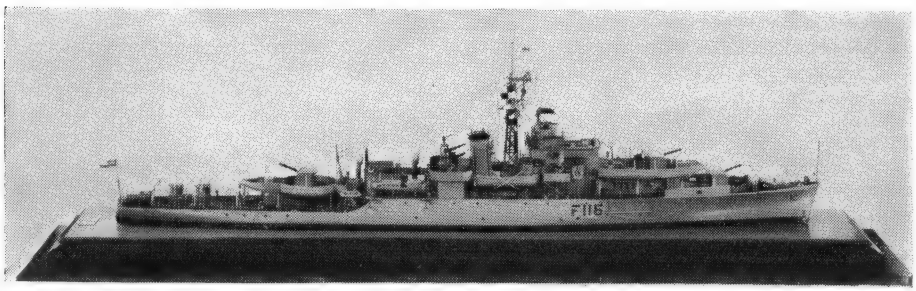
A Model of the Frigate Amethyst

described by A. D. TROLLOPE

LATE in October, the Director of Naval Recruiting placed with Mr. Julian B. Glossop, the well-known builder of miniature ship models, an order for an $\frac{1}{8}$ in. to 1 ft. waterline model of the frigate H.M.S. *Amethyst*. As the officers and crew of the vessel were to be entertained to lunch by the Lord Mayor and Sheriffs of the City of London at the Guildhall on November 16th, 1949, it was suggested that efforts should be made to complete the model by that date in order that it might be exhibited on the Lord Mayor's table.

Obviously this was a task impossible for one man to contemplate and the services of Mr. Arthur D. Trollope were called in to help "shed the load." Up-to-date drawings of H.M.S. *Amethyst* were not immediately available but work was started on the basis of drawings of a sister ship of the same class, H.M.S. *Black Swan*. Actual



construction was started on October 20th, Mr. Trollope building the hull, boats, Carley floats and other small details and Mr. Glossop concentrating on the prefabrication of superstructure, gun turrets and other deck details. The hull was carved from a $1\frac{1}{4}$ in. thick board of Australian red gum, a wood of close texture, with a straight easy grain. Sections were taken off at definite frame positions spaced roughly at 1 in. intervals on the model and were shaped to hollow templates.

H.M.S. *Amethyst* is 299.5 ft. overall so that the model comes out at $37\frac{7}{16}$ in. The lines of the hull are fairly simple, most of the sheer being concentrated ahead of the funnel and the bows having a moderate flare and forming to a slight trawler bow.

The construction of the deckhouses, bridge structure, etc., is based on suitably shaped blocks, covered where necessary with three-ply Bristol board, this material also being used to represent the plastic deck covering of the main deck.

Work had of necessity to be carried on at high speed and there was no time for mistakes and a careful schedule of painting and erection procedure had to be closely followed.

The very exacting task of painting was excellently carried out by Mrs. Sheila Bishop.

Jigs were made for all the intricate soldering jobs on radar aerials, etc., though in order to save time the lattice mast was made up in square brass wire and not in the correct sectioned metal.

In common with all modern warships, H.M.S. *Amethyst* had several structural alterations during her career and it was difficult to obtain authentic information of her exact details, especially as damage sustained during her escape from the Yangtse River entailed the removal of the depth charge gear on the stern and many other important details. Photographs that were available contradicted one another, so that many details had to be put in from knowledge of similar vessels. However, as the model has been closely examined by Admiralty chiefs, Commander Kerens, his crew, and other experts without any adverse comment we can only assume that it is correct as she appeared in 1948.

Boats were carved from obechi block and completely fitted out, including quick release gear and bow ropes to the two whalers. Carley floats were made of $\frac{3}{16}$ in. plastic tube, formed in a wooden jig and are complete with gratings and lifelines.

(*Continued on page* 31)

HYDROPLANE HULL RESEARCH

by D. C. Jeffrey

MODEL hydroplane design has always appeared to me to be almost entirely rule-of-thumb, and I think it must be agreed that at model speedboat regattas the emphasis is on engine performance, not hull performance. A model speedboat enthusiast can tell you the h.p. and "revs" of his engine, but could not tell you the drag of the hull, or its performance relative to other types of hull.

I suggest that it must be possible to *design* a model having a known drag at a predetermined speed, based on performance figures of previous models, instead of just building a boat, and "seeing what happens." I entered on the present series of tests, therefore, to establish if possible relative performance figures for the various present-day hull designs and so try to find the design features necessary for the highest efficiency.

Power Plant Selection

The first problem was to find a reliable power plant having a known consistently high performance, so that the available thrust was constant throughout the series of tests. I finally decided on the Jetex "350" unit, as in addition to the foregoing necessary virtues it is readily started, never "peters out" once started, and has a constant thrust practically *irrespective of speed.* This latter feature is quite unique in model power plants.

On the other hand the use of the Jetex "350" has necessitated hydroplanes of smaller size than was originally intended, also I found that the thrust varies from 3½ oz. to 5 oz. between fuel pellets, although it is fairly constant throughout the run of one pellet. This was found from a test rig which I constructed for the purpose.

Hull Construction

Hard balsa $\frac{1}{16}$ in. thick was used almost exclusively for constructing the series of hulls. I have found this material strong, rigid, and easy to work with. When given six to eight coats of banana oil and two of coloured dope the surface is hard, glossy, and impervious to water. A model hydroplane hull is not in the water long enough to soak up any water, if so treated. Balsa cement was the only fixing agent used, no nails or screws being necessary.

I tried 1 mm. three-ply at first, but found this material relatively heavy, much too flexible, and difficult to join strongly. My balsa hulls have hit the concrete pond side many times at 20 m.p.h. and suffered but little damage.

Stepless Hulls

The first design consideration I set out to investigate was the relationship between "planing beam to length ratio" and speed. I constructed two stepless twin float hulls *A*1 and *B*1 (Figs. 1 and 3) having the same planing area of 24 sq. in., but having beam/length ratios of .120 and .047 respectively. The difference in speed of these two hulls was remarkable considering that the thrusts and all-up weights were the same for each.

Hull *A*1 planed well at as low a speed as 5 m.p.h., but hull *B*1 did not plane cleanly even at its maximum speed. It threw up water at the sides and did not appear to get over its "hump" speed.

The maximum speeds noted on the drawings against each hull were the best of several trials, and I have assumed in each case that the full 5 oz. thrust was obtained at the maximum speed.

The air fins on hull *A*1 were very effective in keeping the hull running straight. On hull *B*1 a small water fin served the same purpose.

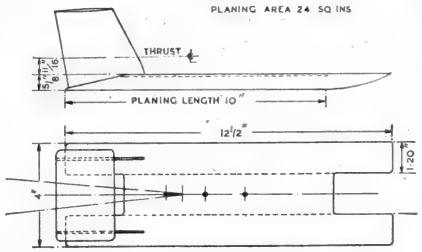
Stepped Hulls

As I expected, I found the unstepped hull *A*1 lacking in longitudinal stability as it travelled in long leaps, so I now proceeded to make both hulls *A* and *B* stepped by adding fully ventilated planes of different types as well be seen in Figs. 2 and 4. The speed of hull *A*2 jumped to about 25 m.p.h. in spite of increase in weight. At this speed the air lift at the nose of the hull caused it to back somersault after about a 50-yd. run.

Hull *B*2 was disappointing and reached only 9/10 m.p.h. and it did not plane cleanly. In the light of further experiments this was due to too large a wetted area in relation to weight and power.

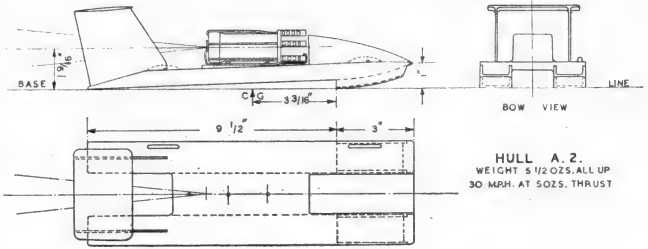
The Circular Course

Up to this time I had not been successful in running these hydroplanes on a circular course, due to the water drag of the line



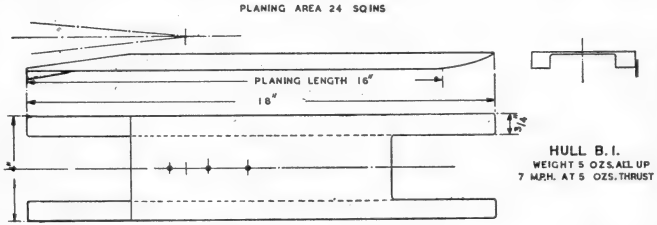
HULL A.1.
WEIGHT 5 OZS. ALL UP
20 M.P.H. AT 5 OZS. THRUST

FIG. 1.



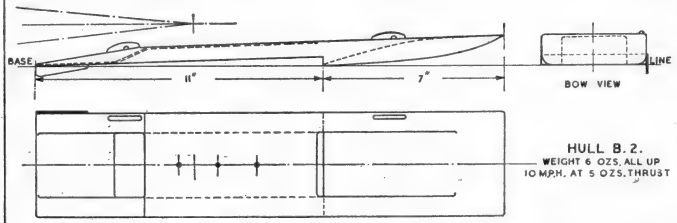
HULL A.2.
WEIGHT 5 1/2 OZS. ALL UP
30 M.P.H. AT 5OZS. THRUST

FIG. 2.



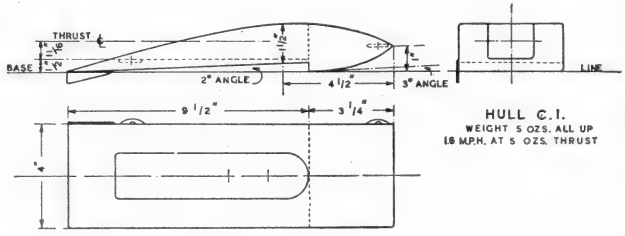
HULL B.1.
WEIGHT 5 OZS. ALL UP
7 M.P.H. AT 5 OZS. THRUST

FIG. 3.



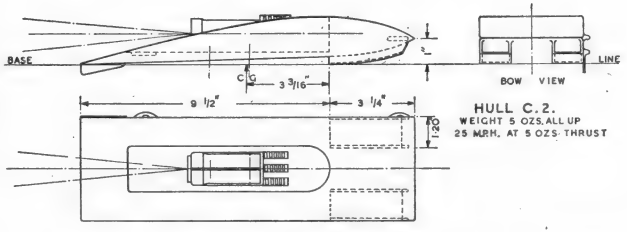
HULL B.2.
WEIGHT 6 OZS. ALL UP
10 M.P.H. AT 5 OZS. THRUST

FIG. 4.



HULL C.1.
WEIGHT 5 OZS. ALL UP
18 M.P.H. AT 5 OZS. THRUST

FIG. 5.



HULL C.2.
WEIGHT 5 OZS. ALL UP
25 M.P.H. AT 5 OZS. THRUST

FIG. 6.

being greater than the thrust, preventing the line becoming taut. I now found that if the maximum pole height were used (one-tenth of the radius as given in the " M.E." Speedboat Competition Rules) and if the circumference were reduced to 40 yd., i.e., 19 ft. 1 in. radius, the line would not drop into the water, provided a hand-assisted start was made. With this arrangement I have had very few false starts. The line used was linen sewing thread.

There seems to be an impression that running a model on a circular course restricts the speed, due to the centrifugal pull on the line, but theoretically this is not correct. The only restriction is the airdrag of the line and this is almost negligible. In actual practice I found that speeds round the pole were higher than straight running, due to the centrifugal lift of the hull. Running hull *A*2 now on the 40-yd. circle I found that the model accelerated more rapidly to 25 m.p.h. at which speed the airlift again became so great that the hull repeated the back somersault.

I then moved the Jetex 1½ in. forward to the position shown on Fig. 2, and on trial the speed rose to about 27 m.p.h. before somersaulting.

At this c.g. position the hull floated nose down and if not started carefully it would " porpoise " below the surface. It was necessary therefore to seek another method of combating front airlift, and this was found in the form of a downsloping plane which also served to streamline the Jetex unit as shown in Fig. 2. With this the model was better balanced at all speeds up to 30 m.p.h., at which speed somersaulting again occurred.

One trouble encountered with the Jetex unit was the dying away of thrust between the first and second charge due to slow ignition of the second charge. This caused porpoising of those hulls which were nose heavy, usually leaving the second charge to hiss away, making a fountain in the middle of the pond !

Centrifugal Lift

At this point I investigated the effect of centrifugal force on the model as it was apparent that the inside float was lifting clear of the water entirely.

I found that a hydroplane travelling in a circle tethered to a pole of height *h* ft. rises just clear of the water, or to coin a term, becomes " centrifugal-borne " when the time of revolution, t sec. $= 2\pi\sqrt{\frac{h}{g}}$ where g is acceleration due to gravity (32.2 ft. per sec. per sec.).

Evaluating this for $h =$ 1.91 ft. (one-tenth of 19 ft. 1 in. radius) we see that the model becomes centrifugal-borne at $t =$ 1.535 sec. or 53 m.p.h. As a matter of interest the corresponding speed for the 100 yd. radius circle is 84 m.p.h. It should be noted that these speeds are quite independent of the weight of the model, and depend only on the height of the pole above the c.g. of the model.

Since the lift due to the centrifugal force varies as the square of the speed, the weight of the *A*2 hull on the water at 30 m.p.h. is reduced to 5 oz. $\times \frac{30^2}{30^2} =$ 3 oz. approximately, which is another reason for the higher recorded speed on the circular course compared to straight running.

Taking this to its logical conclusion it means that if the diameter of circle is taken small enough any well-balanced hydroplane of reasonable straight minimum speed can become centrifugal-borne at the calculated centrifugal-borne speed, and run with only its propeller in the water ! It seems that there is a loop-hole in the " M.E." Speedboat Rules on this point, since a small circle (which is allowed) provides greater centrifugal lift than a larger diameter of circle, if a pole height of one-tenth radius is always used.

The Orthodox Hydroplane

Having progressed this far with twin float hulls, I was curious to know how they compared with an orthodox hydroplane, and so hull *C*1, as shown in Fig. 5 came into being. The hull has the same length, overall beam, and within ½ oz. of the same weight as hull *A*2.

Although I expected the speed to be lower than *A*2, I was not prepared for only about half speed !

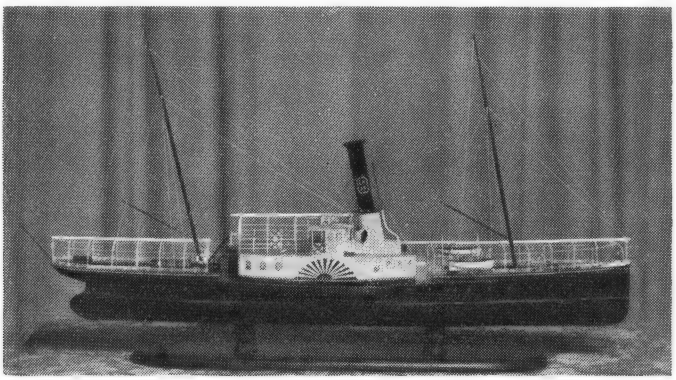
Hull *C*1 was tried many times to see if there was not some mistake, but 16 m.p.h. was the best recorded speed on the 40 yd. circular course.

I now proceeded to fit ventilated front planes to this hull and the result *C*2 is shown of Fig. 6. The width of the two planes was kept the same as in *A*2, i.e. 1.20 in. wide each. On trial, 25 m.p..h was recorded with this hull, and apparently this considerable increase was due mostly to ventilation of the planes. With the Jetex in the position shown there was a tendency for the tail to lift, causing the bow to dig-in and stop abruptly. With

(*Continued on page* 31)

SHIPMODELLING IN TURKEY

SHIPMODELLING as a hobby is indulged in by people in all grades of society and is met with in almost every part of the world. We were, however, greatly interested and not a little surprised to receive the other day a letter from Mr. Mehemet Taki of Istanbul, Turkey, telling us of a small circle of shipmodellers in that city. They look forward every month to receiving their copies of MODEL SHIPS AND POWER BOATS, and we hope before long to hear more of their activities. With his letter Mr. Taki enclosed photographs of two of his models, one of which we reproduce. The model in the picture represents a Bosphorus ferry boat built at Greenock about 50 years ago. Mr. Taki says that people who knew them say they were very beautiful and yacht-like ships. The photograph certainly bears out this description. With their raking masts, the tall slender funnel, the paddle box with its radial perforations, and their dainty hull lines, they were typical of the late Victorian era. Unfortunately they were all sunk in the Black Sea during the 1914-18 war. The model is 20 in. long and is a very clean, neat and attractive piece of work. The other photograph is of a destroyer made some eight years ago, before Mr. Taki's technique had reached its present high standard. It is, nevertheless, a very nice model, well proportioned and full of interesting detail work. We are sure all readers of MODEL SHIPS AND POWER BOATS will join us in sending greetings to our Turkish friends and that we look forward to hearing more of their activities.



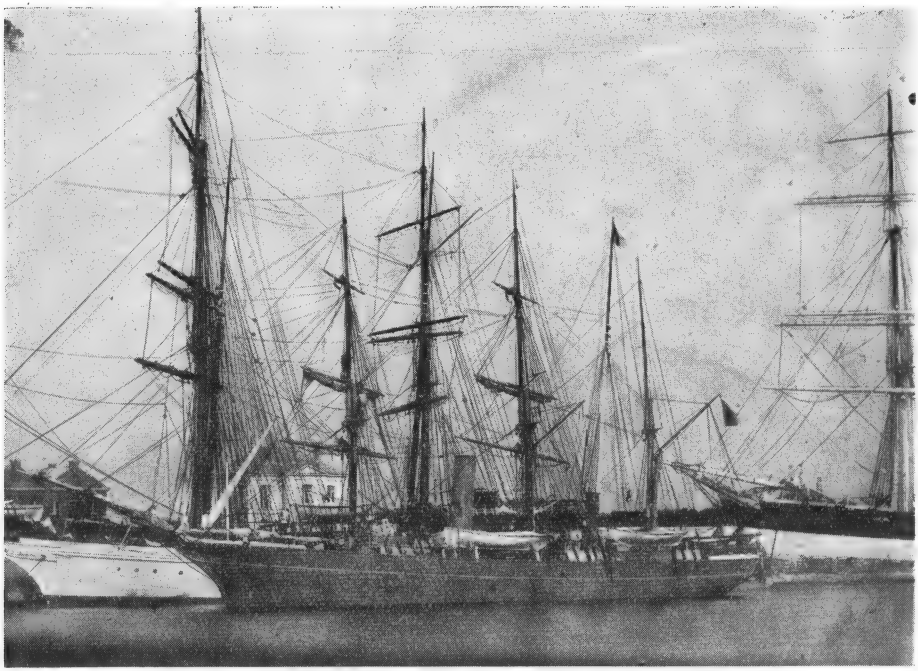
EDITOR'S CORRESPONDENCE

DEAR SIR,—On looking through my November copy of MODEL SHIPS AND POWER BOATS, I notice that your contributor R. K. Battson has turned in the deadeyes in a most unseamanlike manner, see sketches, pages 166 and 167. First of all, the odd eye should be uppermost in the uppermost deadeye, and lowest in the lower one. He has them reversed. It is difficult to see if his sketch is looking at the shrouds, etc., from outside or inside the boat, but certain other faults are there whichever way you look at it; the rule is for the Mathew Walker knot to be for'ard on the starboard side, and aft on the port side and inside on both sides, so that the lanyards can be rove from left to right, and the shrouds should be turned in so that the short end corresponds. Then when setting them up the main strain comes well under the shroud and not on the short seized end.

I know there are many ways of reeving, but only one correct; in these days one frequently sees deadeyes turned in any old way on the few remaining fishing and other craft which use deadeyes instead of rigging screws, but a model might just as well be rigged correctly. Again the two holes should be approximately in centre or just below so that the maximum amount of strength is left in deadeye, if well down as Battson shows in his sketch the odds are that when a heavy strain is put on there is every possibility of the lanyards working clean through the wood.

Yours faithfully,

Westgate-on-Sea. EDGAR J. MARCH



ECHOES OF THE PAST No. 4

Antarctic Research Ship *Belgica*

THE tiny barque in our photograph is the Belgian Research Ship *Belgica*, and was taken shortly before she left Antwerp on August 16th, 1897, under the command of Capt. A. de Gerlache for research work in the Antarctic. Originally she was a Norwegian wooden-built screw sealer named *Patria* and was bought for this particular expedition and renamed *Belgica*. Her dimensions were as follows :—Length between perpendiculars, 118 ft., beam 25 ft., depth, 13.5 ft., gross tonnage, 336. The explorer Amundsen, who later was the first man to reach the South Pole, was mate of the *Belgica* and his experiences on this voyage no doubt contributed greatly to his ultimate success. The voyage was commemorated by the issue of a postage stamp which showed a picture of the ship with men on the ice in the foreground.

The photograph is also interesting in that it affords a comparison between the size of the various types of square-rigged ships. The main and mizzen masts of a large full rigged ship will be seen in the background to the left. Between this ship and the *Belgica* will be seen the handsome bow of a steam yacht, the funnel of which appears between the fore and main masts of the barque. The funnel of the *Belgica* is placed between the main and mizzen masts. The ship lying astern of the *Belgica* is the *Maccullum More*, a main skysail yarder well-known in her day for her fast passages.

Hydroplane Hull Research, continued from page 28

the Jetex moved 1½ in. aft, the model back-somersaulted at about 25 m.p.h.

A low bridle position was used on this hull so that the inner side of the hull (port) lifted clear of the water, as did most of the fin. Hulls *C*2 and *A*.2 were therefore similar in planing area.

Conclusions

While the Jetex unit is useful for the duty described I don't think that it will be popular for model hydroplane propulsion until a continuous burning charge is produced instead of the three separate charges. In practice I gave up using two or three charges because of slow inter-ignition, and used one charge only. On the most efficient hull *A*2 this gave three 40 yd. laps in 9 sec. Although the makers advertise the duration as 12 sec., I found it useless to release the boat until full thrust was developed, and this took about 3 sec.

I wish to stress that the foregoing series of tests are only the first steps in hydroplane experimental work, but already I have found some useful data on which to base future experiments. The results may be summed up as follows :—

(1) There is a " best " ratio of beam to weight for a given thrust. If the beam is too small, the hull does not plane cleanly, and if the beam is too great, surface drag becomes excessive.

(2) A stepped hull is faster than a stepless hull and a ventilated step is faster than a solid step, if other conditions remain unchanged.

(3) Every hull, having a wide planing area forward and having high thrust with low drag, must eventually reach a speed when the air pressure under the bow will cause it to back somersault. In other words the highest speeds will be attained by boats having non-airlifting bows.

Points 1 and 2 are fairly well known and generally accepted, but point 3 is, I think, not yet fully appreciated. So far, only the lightest and highest speedboats are affected by it.

On the basis of the hulls shown in the drawings I suggest that model speedboat builders should make *models* of their models to the same weight and approximate sizes shown, fit them with Jetex 350's and compare performance figures with those given before proceeding with their final models. In this way their " pet " theories can be tried out quickly and easily against known performances.

AMETHYST, *continued from page* 25

All deck details, lockers, vents, hatchways, screens to the " hedgehogs," bridge details, voice pipes, etc., are incorporated. The ports are made of short sections of ⅛ in. brass tube pressed into the hull and filled with 3/32 in. wads of black plastic.

As H.M.S. *Amethyst* was " tropicalised," awning stanchions and guys are shown rigged.

The model was finished a few hours before the promised delivery date after 350 hours of concentrated work. Following the Guildhall luncheon she was on view in the window of the *Daily Telegraph* in Fleet Street, and was later shown at The Schoolboys Exhibition.

Later in the year the model will be on tour round the Provinces in connection with displays arranged by the Naval Recruiting Section of the Admiralty.

The photograph reproduced on page 25 is the official Admiralty photograph and is used by permission of the Technical Reproductions Branch.

News from the Clubs

ROTTERDAM SHIP MODEL SOCIETY

We send our greetings and best wishes to this newly formed society (affiliated to the Netherlands Association of Modellers), which already has a membership of nearly 20. Under their chairman, Mr. C. van der Kellen (himself a first-class modeller) they meet regularly in the library of the *Prins Hendrik* Wartime Museum—a most appropriate rendezvous.

The speaker at the December meeting was Mr. Alec A. Purves, chairman of the N.W. London Ship Model Society, who spoke for an hour (in Dutch) on the history and activities of the ship model movement in Britain. Several interesting questions were asked, particularly as regards obtaining plans and materials, and British ship modellers who may be visiting Rotterdam will be sure of a welcome ; they should enquire at the Museum for dates of meetings.

Shipmodelling has quite a strong following in the Netherlands, although the societies, except the one mentioned above,, are of a general nature. Readers who are visiting the Netherlands and would like to make contact with a local society are advised to write in advance to the secretary of the N.V.M., Mauritslaan 5, Amersfoort. Most of the members speak English, and would welcome the opportunity of discussing ship modelling with British enthusiasts.

The Cardiff and District Ship Model Society

This society was formed as a means of bringing together ship modellers to discuss and exchange knowledge of their hobby. Mr. I. W. Marsh was elected chairman and Mr. L. W. G. Dunn, of Lon-y-Mynydd, Cardiff, was elected secretary. Mr. Marsh is well known at the *Model Engineer* Exhibitions, and in the recent exhibition he had a stand where he demonstrated ship-modelling methods as exemplified by the work he was doing on his new model of the clipper *Thermopylae*.

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All correspondence relating to sales of the paper should be addressed to THE SALES MANAGER and correspondence relating to display advertisements to THE ADVERTISEMENT MANAGER.

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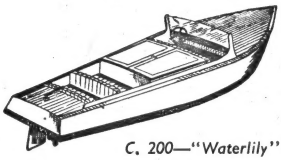

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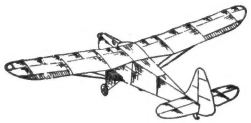

B.161—Luton Major

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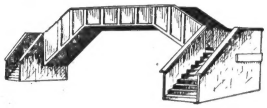

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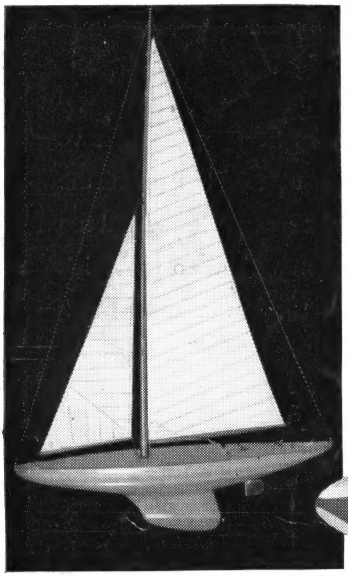

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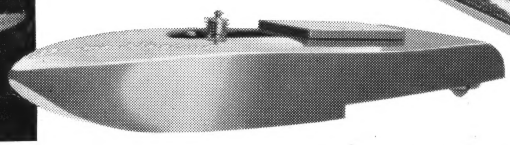

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